

CLAIMS

What is claimed is:

1. A display device comprising:
 - a display unit for forming a predetermined display mode; and
 - a display switching unit overlapping the display unit at least in one portion, wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second polarization component selecting means sequentially disposed from the display unit toward an observation side,
 - the first polarization component selecting means transmits a first polarization component and reflects a second polarization component having a polarization axis intersecting with a polarization axis of the first polarization component,
 - the polarized-light transmitting axis changing means is switchable between a state of transmitting light after changing the first polarization component into the second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,
 - the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other polarization component,
 - the display unit emits the first polarization component for forming the display mode, and
 - the display unit and the display switching unit are optically adhered to each other.

2. The display device according to Claim 1, wherein the display unit and the display switching unit are optically adhered to each other by adhesive.

3. The display device according to Claim 2, wherein refraction index of the adhesive layer is within a range of 1.30 to 1.50.

4. The display device according to Claim 2, wherein the adhesive layer is a gel material.

5. A display device comprising:
a display unit for forming a predetermined display mode; and
a display switching unit overlapping with the display unit at least in one portion,

wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second polarization component selecting means sequentially disposed from the display unit toward an observation side,

the first polarization component selecting means transmits a first polarization component and reflects a second polarization component having a polarization axis intersecting with a polarization axis of the first polarization component,

the polarized-light transmitting axis changing means is switchable between a state of transmitting light after changing the first polarization component into the

second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,

the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other polarization component,

the display unit emits the first polarization component for forming the display mode, and

an anti-reflection coating is formed on both sides of the display switching unit.

6. The display device according to Claim 5, wherein

the anti-reflection coating is formed on a surface of the display unit on a side of the display switching unit.

7. A display device comprising:

a display unit for forming a predetermined display mode; and

a display switching unit overlapping with the display unit at least in one portion,

wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second polarization component selecting means sequentially disposed from the display unit toward an observation side,

the first polarization component selecting means transmits a first polarization component and reflects a second polarization component having a

polarization axis intersecting with a polarization axis of the first polarization component,

the polarized-light transmitting axis changing means is switchable between a state of transmitting light after changing the first polarization component into the second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,

the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other polarization component,

the display unit emits the first polarization component for forming the display mode, and

the display switching unit is provided with a whole pixel region, which includes a single pixel arranged on an entire face, and a pixel-arranged region, which includes a plurality of pixels, each pixel having a predetermined shape smaller than the whole pixel region.

8. A display device comprising:

a display unit for forming a predetermined display mode; and

a display switching unit overlapping with the display unit at least in one portion,

wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second polarization component selecting means sequentially disposed from the display unit toward an observation side,

the first polarization component selecting means transmits a first polarization component and reflects a second polarization component having a polarization axis intersecting with a polarization axis of the first polarization component,

the polarized-light transmitting axis changing means is switchable between a state of transmitting light after changing the first polarization component into the second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,

the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other,

the display unit emits the first polarization component for forming the display mode, and

the display switching unit is provided with a region including the first polarization component selecting means and a region including a third polarization component selecting means for transmitting the first polarization component and for absorbing the second polarization component.

9. A display device comprising:

a display unit for forming a predetermined display mode; and

a display switching unit overlapping with the display unit at least in one portion,

wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second

polarization component selecting means sequentially disposed from the display unit toward an observation side,

the first polarization component selecting means transmits a first polarization component and reflects a second polarization component having a polarization axis intersecting with a polarization axis of the first polarization component,

the polarized-light transmitting axis changing means is switchable between a state of transmitting light after changing the first polarization component into the second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,

the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other polarization component,

the display unit emits the first polarization component for forming the display mode, and

the display unit is provided with a region not overlapping with the display switching unit.

10. A display device comprising:

a display unit for forming a predetermined display mode; and

a display switching unit overlapping with the display unit at least in one portion,

wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second

polarization component selecting means sequentially disposed from the display unit toward an observation side,

the first polarization component selecting means transmits a first polarization component and reflects a second polarization component having a polarization axis intersecting with a polarization axis of the first polarization component,

the polarized-light transmitting axis changing means is switchable between a state of transmitting light after changing the first polarization component into the second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,

the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other,

the display unit emits the first polarization component for forming the display mode, and

the display switching unit is provided with a region not overlapping with the display unit two dimensionally, where a plurality of pixels of a predetermined shape are arranged.

11. A display device comprising:

a display unit for forming a predetermined display mode; and

a display switching unit overlapping with the display unit at least in one portion,

wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second

polarization component selecting means sequentially disposed from the display unit toward an observation side,

the first polarization component selecting means transmitting a first polarization component and reflects a second polarization component having a polarization axis intersecting with a polarization axis of the first polarization component,

the polarized-light transmitting axis changing means is switchable between a state of transmitting light after changing the first polarization component into the second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,

the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other,

the display unit emits the third polarization component for forming the display mode, and

a polarization converting means for converting the third polarization component into the first polarization component is provided between the display unit and the display switching unit.

12. The display device according to Claim 11, wherein the polarization converting means is a retardation plate.

13. The display device according to Claim 12, wherein the retardation plate is a plate of a half ($1/2$) wavelength.

14. The display device according to Claim 1, wherein
the second polarization component selecting means is absorptive polarization selecting means for transmitting the one of the polarization components and absorbing the other polarization component.

15. A display device comprising:
a display unit for forming a predetermined display mode; and
a display switching unit overlapping with the display unit at least in one portion,

wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second polarization component selecting means sequentially disposed from the display unit toward an observation side,

the first polarization component selecting means transmits a first polarization component and reflects a second polarization component having a polarization axis intersecting with a polarization axis of the first polarization component,

the polarized-light transmitting axis changing means is switchable between a state of transmitting light after changing the first polarization component into the second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,

the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other polarization component,

the display unit emits the first polarization component for forming the display mode,

the display unit includes an illuminating device disposed on the side of the display switching unit, and a reflective display device disposed on the opposite side of the illuminating device and away from the display switching unit,

the illuminating device emits light toward the reflective display device and transmits light incident from the reflective display device,

the polarized-light transmitting axis changing means includes a TN-type liquid crystal layer and a voltage application means for applying a predetermined electric field to the TN-type liquid crystal layer in a thickness direction, and

the TN-type liquid crystal layer has $\Delta n \cdot d$ within a range of $0.7 \mu\text{m}$ to $1.7 \mu\text{m}$.

16. The display device according to Claim 15, wherein
the TN-type liquid crystal layer has the $\Delta n \cdot d$ within a range of $0.9 \mu\text{m}$ to $1.3 \mu\text{m}$.

17. A display device comprising:
a display unit for forming a predetermined display mode; and
a display switching unit overlapping with the display unit at least in one portion,

wherein the display switching unit includes first polarization component selecting means, polarized-light transmitting axis changing means, and second polarization component selecting means sequentially disposed from the display unit toward an observation side,

the first polarization component selecting means transmits a first polarization component and reflects a second polarization component having a polarization axis intersecting with a polarization axis of the first polarization component,

the polarized-light transmitting axis changing means is formed to be switchable between a state of transmitting light after changing the first polarization component into the second polarization component and a state of transmitting light without substantially changing the polarization axis of the incident light,

the second polarization component selecting means transmits one of the first polarization component and the second polarization component and absorbs or reflects the other polarization component,

the display unit emits the first polarization component for forming the display mode,

the display unit includes an illuminating device disposed on the side of the display switching unit, and a reflective display device disposed on the opposite side of the illuminating device and away from the display switching unit,

the illuminating device emits light toward the reflective display device and transmits light incident from the reflective display device,

the polarized-light transmitting axis changing means includes a TN-type liquid crystal layer and a voltage application means for applying a predetermined electric field to the TN-type liquid crystal layer in a thickness direction, and

the TN-type liquid crystal layer has $\Delta n \cdot d$ within a range of $0.50 \mu\text{m}$ to $0.65 \mu\text{m}$.

18. A display device comprising: